

WAYNE W. CARMICHAEL

December 2010

CURRICULUM VITA

Education

University 1965-67	Portland Community College, Portland, Oregon Associate of Arts Degree (Liberal Arts)
1968	Portland State University, Portland, Oregon
1968-69	Oregon State University, Corvallis, Oregon Bachelor of Science Degree, Botany
1969-70	Post Baccalaureate in Zoology at Oregon State. Dr. Harry K. Phinney - Dept. of Botany, Supervisor.
1970-72	M.Sc. University of Alberta, Edmonton, Alberta. Botany. Supervisor, Dr. Paul R. Gorham. Thesis title: Some Factors Influencing Toxin Production and Accumulation by <i>Anabaena flos-aquae</i> NRC-44-1.
1972-74	Ph.D. candidate at the University of Alberta, Botany. Supervisor, Dr. Paul R. Gorham. Thesis title: <i>Anabaena flos-aquae</i> Toxin: Its Toxicology and Mechanism of Action.

Relevant Work Experience and Awards at Oregon State University

1965-70	Summers - employed by Department of Agriculture U.S. Forest Service, Mt. Hood National Forest.
June 1968	Technician on oceanography cruise aboard R/V <u>Yaquina</u> under Dr. Kilho Park, Chemical Oceanographer - Oregon State University. Duties included laboratory technician taking water samples for oxygen, chemical, temperature and pH data.
1969	(June-August) Worked under Dr. William Chilcote Plant Ecology supported by a National Science Foundation summer stipend on a vegetation analysis problem in the Mary's Peak Water Shed. Corvallis, Oregon.
1968-69	Part-time employment in Department of Botany under Dr. Converse (Plant Virology) as greenhouse aid.

Awards/Honors/Appointments

1970-72	National Research Council Research Assistant Award, University of Alberta.
1972-74	Graduate Teaching Assistantship Award, University of Alberta.
1974-76	Post-Doctoral Appointment, P.R. Gorham, working on ecological, toxinological and pharmacological problems of cyanophytes. D.F. Biggs - Faculty of Pharmacy - pharmacology of cyanophyte toxins.
Sept. 1976	Assistant Professor of Biology, Department of Biological Sciences, Wright State University. Appointment in Aquatic Biology/ Toxicology.
Sept. 1981	Associate Professor with tenure - Dept. of Biological Sciences, Wright State University.
1987-88	Outstanding Research Award - College of Science and Mathematics, Wright State University.
Sept. 1988	Full Professor - Dept. of Biological Sciences, Wright State University.
June 1989	Co-Vice Chair - Gordon Research Conference on Mycotoxins and Phycotoxins, Plymouth, NH, June 26-30.
1989-1991	Outstanding University Research Award - Wright State University.
Oct. 1990	Appointed member of International Society of Toxinology (IST) - Nomenclature Committee (to develop standardization of nomenclature for toxins).
June 1991	Chair - Gordon Research Conference on Mycotoxins and Phycotoxins, Plymouth, NH, June 24-28, 1991.
Sept 1995-Aug 98	Brage Golding Distinguished Professor of Research - Wright State University
1997-2000	Board of Scientific Advisors, Earth Rise Farms, (algae production) California and Japan
May 1999	James H. Nakano Award-from National Center for Infectious Diseases of CDC for outstanding paper of 1998 published within NCID-co-authored with CDC (New England Journal of Medicine).
May 2000	Appointed member of toxin nomenclature committee within the International Union of Pure and Applied Chemistry (IUPAC)
July 2002	Associate Director-Environmental Sciences Ph.D. Program-Wright State University

July 2003-July 2007 Director-Environmental Sciences Ph.D. program-Wright State University

October 2005 Recipient of Wright State University-4th Annual-International Education Award. Office of International Education.

November 2007 Elected to three year term on the National Harmful Algae Bloom Committee

November 2010 Re-elected to three year term on the National Harmful Algae Bloom Committee

University Administrative/Committee Experience
(Wright State University)

Departmental:

Promotion and Tenure (Faculty Development) (Chair)
Graduate Curriculum (Chair)
Chair Review - 5 year (Chair)
Faculty Search Committee - Toxicology; Cell/Molecular Biology; Ecology
(Chair), Plant Physiology
Departmental Chair Search Committee (Chair), Plant Physiology
Undergraduate Curriculum Committee
Electron Microscope Use Committee
Biology Preserve Use Committee
Departmental Seminar Committee

Biomedical Sciences Ph.D. Program:

Election Committee (Chair)
Admissions Committee

College of Science and Mathematics:

Dean Review Committee - 3 year (Chair)
Scholarship Committee (Chair)
Student Appeals Committee
Research Services Chair Search Committee
Dean - Chair Search Committee

School of Graduate Studies:

Graduate Research Council

University:

Academic Council

Professional Leave - Visiting Faculty Appointments

Visiting Scientist - University of Dundee - Dundee, Scotland -Department of Biological Sciences - July 1983; July 1984.

Visiting Scientist - Norwegian Institute of Water Research - Oslo, Norway - July 1983 and August 1984.

Professional Leave - University of Hawaii - Department of Chemistry - July 1986 - July 1987.

Visiting Scientist - Hydrobiological Institute - Academy of Sciences - Wuhan, Hubei, P.R. China - September - October 1986.

Visiting Scientist - National Institute for Environmental Studies - Japan Environment Agency - Tsukuba, Japan - Dec. 5-17, 1988.

Visiting Scientist - Department of Microbiology - University of Helsinki - Sept. 1989.

Visiting Scientist - Hydrobiological Institute - Academy of Sciences - Wuhan - P.R. China - August 1990.

Visiting Scientist - Leningrad Nuclear Physics Institute - Acad. Sci. - USSR Biopolymer Laboratory - May 1990.

Visiting Scientist - Hydrobiological Institute - Academy of Sciences - Wuhan - P.R. China - August 1991.

Visiting Lecturer/Scientist - Institute of Zoology - University of Porto - Porto, Portugal - May-June 1992. Supported by the Luso-Americana Foundation.

Visiting Lecturer/Professor - Nucleo De Pesquisas De Produtos Naturais - Universidade Federal Do Rio De Janeiro, Brazil - July 1992. Supported by the Federal University.

Visiting Professor - Shanghai Medical Institute - School of Public Health - Shanghai, P.R. China - 1992-1995.

Visiting Research Professor - University of Tokyo - Research Center for Advanced Science and Technology. Toyo Suisan Endowed Chair in Marine Biotechnology. January - May 1993.

Visiting Scientist - Nucleo De Pesquisas De Produtos Naturais - Universidade Federal Do Rio Janeiro, Brasil - September 1997. Supported by CNPq.

Visiting Scientist - Institute of Hydrobiology, National Academy of Science - Ukraine, Kiev. Supported by U.S. Civilian Res. & Develop. Foundation. January 1998.

Visiting Research Professor - CSIRO Land and Water, Brisbane, Australia, January - June, 1998.

Visiting Scientist - Institute of Hydrobiology, National Academy of Science - Ukraine,

Kiev. Supported by U.S. Civilian Res. & Develop. Foundation. August 1999.

Visiting Research Scientist-Finnish Marine Research Institute-Helsinki-August 1999

Visiting Professor-Ecole Supérieure de Chimie et de Physique-Paris, France-June/July 2003

Visiting Professor-Univ Federal Rio de Janeiro-Brazil-Jan-March, 2006. Supported by CnpQ

Teaching Experience

- A. Teaching Assistantship/Instructor
 - General Biology - ecology, genetics, molecular/cellular/organismic
 - Plant Physiology
- B. Tenured Faculty
 - General Biology - ecology, genetics, molecular/cellular/organismic (including Honor's Lab)
 - Biology of Lower Plants (Phycology/Mycology)
 - Ecotoxicology
 - Environmental Toxicology
 - Economic Botany
 - Cell Biology

Departmental/College - Seminars - Wright State University

Cell Cytoskeleton
Natural Product Toxins
Algae and Aquatic Ecosystems
Applied Algology
Biological Nitrogen Fixation
Symbiosis
Chemical Studies and Methods of Analysis for Cyanobacteria (blue-green algae)
Toxins
Lectins
Game Preserves of Southern Africa
Biotechnology
Environmental Toxicology
Toxicology of the Liver
Cyanotoxins
Biology of Harmful Algae Blooms
Risk Assessment for Human Health-The Chernobyl Example
Chemical and Biological Threat Agents

Off Campus - Invited Seminars

University of Dundee - Department of Biological Sciences - Scotland, 1981.

University of Bloemfontein; University Capetown; University of Natal; University Stellenbosch - Republic of South Africa, 1982.
 University of Toledo, Ohio - Department of Biological Sciences, 1983.
 Norwegian Water Research Institute - Symposium, Research on Toxic Blue-green Algae - Progress and Perspectives - Oslo, Norway, 1983-1984.
 Norwegian Public Health Institute - Oslo, Norway, 1983.
 U.S.S.R. Academy of Sciences - Leningrad, U.S.S.R., 1984.
 City of Norman, Oklahoma - Algal Problems Drinking Water, 1986.
 Georgia Technical University, Atlanta - Dept. Applied Biology - 1986.
 University Regina - Regina, Sask (Environment Canada) - 1986.
 Washington State University - Pullman, Washington - School Vet. Medicine - 1986.
 Peoples Republic of China - Sept./Oct. 1986 - Jinan University, Guangzhou (Canton) - Dept. of Biology: Institute of Hydrobiology, Phycology Section - Wuhan: Anhui University, Hefei - Dept. of Biology: Environmental Protection Bureau of Hefei Municipality, Anhui Province.
 University of Helsinki, Finland - Department of Microbiology, May 1987 (Plenary address - 50th Anniversary of the Dept. of Microbiol.).
 University of Hawaii - Honolulu, HI - Department of Botany - 1987.
 Frostburg State University, Maryland - Department of Biology - Biotechnology Seminar Series - March 21, 1988.
 University of Dayton, Ohio - Department of Biology - Sept. 22, 1988.
 National Institute for Environmental Studies - Tsukuba, Japan - Toxic Algae - Plenary Lecture - Dec. 6, 1988.
 National Cancer Center, Tokyo - Algae, Secondary Chemicals and Biotechnology - Dec. 13, 1988.
 Chiba University Institute of Eucaryotic Microorganisms - Tokyo, Japan - Toxic Algae - Dec. 14, 1988.
 Florida State Health Dept. - South Florida Water Management District - Algal Toxins in Lakes of Florida - Feb. 16-17, 1989.
 Sigma Xi - Cincinnati Federal Environmental Chapter - USEPA - Toxic Cyanobacteria - March 23, 1989.
 National Institutes of Health - USUHS - Bethesda, Maryland - Cyanobacterial Secondary Chemicals - September 8, 1989.
 University of Northern Kentucky - Dept. of Biological Sci. - Chemical Ecology of Toxic Cyanobacteria - October 4, 1989.
 California State Department of Health - Conference Call Seminar Series - Continuing Education - May 4, 1990.
 Antioch University - Yellow Springs, Ohio - Biology Unit - March 1990.
 Leningrad Nuclear Physics Institute - Academi Sciences - U.S.S.R. - May 30, 1990.
 Biological Institute of Leningrad University - U.S.S.R. - May 31, 1990.
 Institute of Hydrobiology - Academy of Sciences - Ukrainian S.S.R. - June 2, 1990.
 Atlantic Research Laboratory - (Inst. Marine Bio. Sci.) - National Research Council Canada - Halifax, Nova Scotia - July 18, 1990.
 Heidelberg College - Tiffin, Ohio - Biology Department - October 25, 1990.
 Peoples Republic of China - August 1991 - Peking University, Beijing, Biology Department; Harbin Normal University, Harbin, Biology Department; Manjouli Fisheries Institute, Inner Mongolia; Hydrobiology Institute, Academia Sinica, Wuhan, Hubei. "Algae Toxins."

John Carroll University - Cleveland, Ohio - Cyanotoxins - November 8, 1991.
 Antioch-Kettering Research Laboratory - Antioch University - Yellow Springs, Ohio - March 12, 1992.
 Institute of Zoology - University of Porto, Porto, Portugal - May 1992.
 Nucleo De Pesquisas De Produtos Naturais - Univ. Federal Do Rio De Janeiro, Brazil - July 1992.
 CETESB - Secretariat for the Environment - State of Sao Paulo, Brazil - July 1992.
 National Cancer Center, Tokyo, Japan - August 1992.
 Commissario Straordinario Ente Autonomia Del Flumendosa, Cagliari, Sardinia, Italy - September 29, 1992.
 Dipartimento Di Botanica Del Università Di Sassari, Sardinia, Italy - October 2, 1992.
 University of Miami - Department of Botany, Oxford, Ohio - October 31, 1992.
 Tokyo Science University - Faculty of Pharmaceutical Sciences, Japan - April 14, 1993.
 Japanese Society of Marine Biotechnology, Tokyo, Japan - April 21, 1993.
 Marine Biotechnology Institute, Shimizu, Japan - May 10, 1993.
 University of Tokyo, Research Center Advanced Science and Technology, Tokyo, Japan - May 18, 1993.
 Meijo University, Nagoya, Japan, School of Pharmaceutical Sciences - March 12, 1993.
 University of Cincinnati, School of Medicine, Allergies Department, Medical Sciences Building - June 1993. University of Wisconsin, Milwaukee - Great Lakes Center for Water Research - April, 1994.
 Ohio State University, Department of Medical Microbiology - May, 1994.
 Antioch College - Biology Program - June, 1994.
 Andrews University - Berrien Springs, Michigan - November, 1994.
 Ohio State University, University Extension-Greene County - Master Gardeners. Lower Plants. March 28, 1995.
 Antioch College - Yellow Springs, OH. Aquatic Biology/Algae. December 1995.
 Sinclair Community College - Dayton, OH. Mass Destruction Threats-Chemicals, Biological or Psychological. Dayton Council on World Affairs Forum. May 1, 1995.
 Miami University, Oxford, OH, Department of Microbiology. May 1996.
 Bowling Green State University, Bowling Green, Ohio. April 1997.
 Kettering Medical Center, Dayton, Ohio - Grand Round Seminar Series. June 4, 1997.
 Federal University of Rio de Janeiro - NPPN - Sept. 1997.
 Federal University of Pernambuco, Recife - ITEP - Sept. 1997.
 Finnish Marine Research Institute-Helsinki, Finland-July 1999
 Univ. Helsinki-Vikki Biocenter-Helsinki, Finland-July 1999
 Univ. of Florida-Florida Wildlife Coop Unit and Center for Natural Resources-Gainesville, Florida-Sept. 1999
 Univ. Of Illinois, College of Veterinary Medicine, Urbana, Ill. Toxic Cyanobacteria and Animal Health. Oct 4-5 2001.
 Ohio State University-Dept Civil and Environmental Engineering and Geodetic Science. Oct. 7, 2002
 Univ of Dayton, Biology Dept. Feb. 20, 2003.
 Pasteur Institute, Paris, France-July 7, 2003-invitation from Nicole de Marsac-Head

of Unit of Cyanobacteria

Univ of Perpignon-Center for Pharmacology-Perpignon-France-June 10, 2003

(invited, host: Jean Louis Marty)

Cornell Univ-Ithaca, NY.-Center for the Environment. April, 2004. (invited)

October 12 Discussion for the 2004 Nebraska Epi-Aid presentation by Zandra

Duprey, DVM, MPH. Preethi Rao, PhD, MSc "Why is the lake killing our dogs?

Harmful algal blooms, Nebraska May 9-15, 2004". Centers for Disease and Control, Atlanta, GA.

Seminar for the "World of Healthy Water Series" Centers for Disease Control-

Atlanta, GA. October 12, 2004

WSU-Ecology Brown Bag Seminar series-May 2004.

Univ of Ill-Urbana. Dept Vet Sciences seminar series-Sept 2004.

Collaborative Research Projects - Visiting Scientists

- 1983 Prof. G.A. Codd - Univ. of Dundee - Scotland - 2 weeks.
- 1984 C. Benestad - Sr. Researcher - Chemical Research Institute - Oslo, Norway - 3 months.
- 1985 K. Berg - DVM - Sr. Lecturer - College of Veterinary Medicine - Oslo, Norway - 2 months.
- 1985 Dr. Yu Min-Juan - Hydrobiological Institute - Wuhan, Hubei - P.R. China - 2 weeks.
- 1987 He Jia-Wan - Sr. Researcher - Hydrobiological Institute - Wuhan, Hubei - P.R. China - 3 months.
- 1988 Kaarina Sivonen - Ph.D. candidate - Dept. of Microbiology - Univ. of Helsinki, Finland - 4 months.
- 1988-90 Zhang Qing-Xue - Ph.D. candidate - Dept. of Phycology - Hydrobiological Institute - Wuhan, Hubei - P.R. China - 18 months.
- 1989 Dr. Mariyo Watanabe - Research Scientist - Tokyo Metropolitan Research Laboratory of Public Health - Tokyo, Japan - 2 weeks.
- 1990 Dr. Hans Petterson - Saskatchewan Research Council - Saskatoon, Canada - 1 week.
- 1990 Dr. Yu Min-juan - Hydrobiological Institute - Wuhan, P.R. China - 3 months.
- 1990-91 Dr. Kaarina Sivonen - Dept. Microbiology, Univ. of Helsinki, Finland - 8 months.
- 1991 Dr. Sandra M.F. Oliveira e Azevedo. Institute for Natural Products - Universidade Federal Do Rio De Janeiro - Brazil - 3 months.
- 1991 Vitor Manuel Vasconcelos - Instituto de Zoologia, Universidade do Porto, Portugal - 1 month.
- 1991 Dr. Vladimir M. Tchernajenko - Dept. Mol. & Radiation Biophysics, Leningrad Nuclear Physics Institute, USSR Acad. Sci., USSR - 1 month.
- 1991 Dr. Fernando Zambrano - Facultad de Ciencias, Dept. Biol., Universidad de Chile, Santiago, Chile - 1 week.
- 1991-92 Dr. Takashi Ooi - Tokyo University of Fisheries, Japan - 10 months.
- 1992 Lilian Fornarolli De Andrada and Christine Da Fanseca Xavier, Superintendencia Dos Recursos Hidricos E Meio Ambiente, Estado Do Parana, Curitiba, Parana, Brazil - September 1992.
- 1992 Caetano Mautone and Maureen Sakagani, SABESP - San Paulo, Brazil - December 1992. (toxic algae training session)

- 1993 Vitor Vasconcelos; Filipa Ferreira - University of Porto, Portugal - July, August.
 1993 Dr. Sandra Azevedo - Federal University Rio De Janeiro - July, August.
 1993 Dr. Inderjit - Dept. of Botany, University of Delhi, Delhi, India - September.
 1994 Dr. Youssef Garas Yanni Khalil - Sakha Agricultural Res. Station, Sakha, Egypt - Training program through Egyptian NARP - San Diego State University - January.
 1994 Dr. Mohamed Nasr Eldeen - National Research Center, Cairo, Egypt - Training program through Egyptian NARP - USDA, Wash. D.C. - January
 1995 Dr. Sandra Azevedo - Federal University Rio De Janeiro - July
 1995-96 Monica M. Zanta de A. Nobre, University of San Paulo, Brazil - January 1995 - July 1996 - Ph.D. Fellowship.

 1996 Peter Hendrickson, University of Copenhagen, Denmark. March. Ph.D. Fellowship.
 1996 Jutta Fastner - National Institute Health/Environment, Berlin, Germany. January. Ph.D. Fellowship.
 1996-97 Zakaria Attia Mohamed. South Valley University, Sohag, Egypt. Egyptian Channel Program. Ph.D. Fellowship.
 1996 Dr. Michio Namikoshi - visiting Scientist - Tokyo Fisheries University - Japan - 1 month
 1997 Dr. Mohamed Nasr Eldeen - visiting Scientist - National Research Center. Cairo, Egypt. July.
 1997 Jesper Laub, University of Copenhagen, Denmark. May.
 1999 Hae Kyung Park-National Institute of Environmental Research-Korea-Feb-March
 1999 Ho Dong Park-Dept. Envir. Sci. – Shinsu Univ.-Japan-May 1998-March 1999
 1999 Harri Kankaanpaa-Finnish Marine Research Institute, Helsinki, Finland-March
 1999 Sandra M. F. O. Azevedo-Fed Univ. Rio Do Janeiro, Brazil-Oct.
 1999-2001 Habte Debella-Arbaminch Water Technology institute, Ethiopia
 2000 Rute Miguel-Universidade do Algarve-Portugal-January-March
 2000 Claire Herbert-Freshwater Institute-Winnipeg, Ma, Canada-June
 2000-2001 Dr. Khaled J. Allayl-Faculty of Applied Sciences-Umm Al-Qura Univ. Saudi Arabia
 2001 Paulo Perira-Instituto Nacional de Saude-Libon, Portugal-February-March
 2002 Dr Anna Lankoff-Instit. Biol. Swietokrzyska Academy-Poland
 2002 Raquel Soares-Instituto Biophysics-Fed. Univ. Rio de Janeiro-Brazil
 2003 De. E.A.D. Allen-Alberta Canada-Envir Engineering

Scientific Society Affiliations

American Association for the Advancement of Science (AAAS)
 International Society of Toxinology (IST)
 Societas Internationalis Limnologiae (SIL)
 North American Lake Management Society (NALMS)
 The Ohio Academy of Sciences (OAS)
 Ohio Lake Management Society (OLMS)

Commission Membership

International Union of Pure and Applied Chemistry - Food Commission - Working Group on Aquatic Biotoxins

Organizing member of joint cooperative research between the National Institute of Environmental Sciences (NIES) Japan and the U.S. Environmental Protection Agency (USEPA) - Toxic Cyanobacteria

Workshops

Workshop on Microbial Contamination in Drinking Water. Airlie House, Virginia, Dec. 1981. Member of Panel on "Agents of Waterborne Disease." U.S.E.P.A./ASM.

Workshop on Food Contamination - Mycotoxins and Phycotoxins - Cairo, Egypt - National Research Center. November 4-15, 1990. "Freshwater Toxins of Cyanobacteria." USAID, IUPAC, FDA and Egyptian Scientific Research.

Workshops on Phycotoxins - IUPAC Mycotoxin and Phycotoxin, VIII Int. Symposium - Mexico City, Mexico. November 12, 1992. "Toxic Freshwater Cyanobacteria."

Workshops on Toxic Cyanobacteria - American Water Works Association (AWWA) - Research Foundation - Adelaide, Australia - March, 1994 - (Member of Program Committee and Session Organizer).

Fourth Canadian Workshop on Harmful Marine Algae - Sydney, British Columbia, May 3-5, 1994. (Invited speaker).

World Health Organization (WHO) - European Center for Environment and Health - Editorial Board member- Workshop - "Cyanobacteria, their toxins, water and health." May and November, 1997. Bad Elster, Germany.

Arkansas Eagle Mortality Task Force Committee Workshop - DeGray Lake. Little Rock, Arkansas, May 2, 1997.

Algal Metabolites - Specialist Workshop - "Occurrence - What is the extent of the problem?" International Water Supply Association (IWSA) - sponsored by Lyonnaise Des Eaux and Essex Suffolk Water, Prague, Czech Republic. May 23, 1997.

U.S.E.P.A. - Gulf Ecology Division, Pensacola, Florida. Harmful Algal Bloom Workshop, October 6-7, 1997.

National Research Center for Environmental Toxicology (NRCET)-Brisbane, Australia, May 1998-Workshop-Rapid Screening Methods for Microcystins and Nodularins

State of California Water Board. Algal Blooms & Water Quality . June 1-4,

2009Sponsoring Program:Ocean Standards Unit, Division of Water Quality. Four Days (Two Days per Session) June 2009. University of California, Santa Cruz.

Workshop on Cyanobacteria Harmful Algae Blooms and Water Quality May 24-25, 2010. Oregon Department of Human Services – Public Health Division – Harmful Algal Bloom Surveillance Program and the Oregon Lakes Association.

Workshop on Phycotoxins. Phyco and Mycotoxins-Taller pre-congress workshop on Phycotoxins June 26-27, 2010-Merida, Yucatan, Mexico. Congress on Mycotoxins and Phycotoxins.

Journal Referee

Science
Journal of Phycology
Bioscience
Hydrobiologica
South African Journal of Science
Journal of American Veterinary Medicine Association
Toxicon
Chemico-Biological Interactions
Archivs for Hydrobiologie
Applied and Environmental Microbiology
Australia J. of Marine and Freshwater Research
Natural Toxins
Phycologia
Biomedical and Environmental Sciences
Carcinogenesis
Botanical Bulletin - Academia Sinica- Taiwan
Limnology and Oceanography
Journal of Toxicology and Toxin Reviews
Journal of the American Water Works Association

Editorial Board Member

Toxicon
J. Applied Phycology
J. Toxicology - Toxin Reviews
Biomed and Envir Sci.

Conference Organization

- 1980 International Conference on the Water Environment: Algal Toxins and Health. Sponsored by the U.S.E.P.A., Wright State University, Dayton, OH. (Conference chair)
- 1989 Gordon Research Conference on Mycotoxins and Phycotoxins. North Plymouth, NH. (Conference Co-chair)
- 1991 Gordon Research Conference on Mycotoxins and Phycotoxins. North Plymouth, NH. (Conference Chair)
- 1998 4th Int. Conf. On Toxic Cyanobacteria-(Co-chair with Hans Paerl)-Duke Marine Center, Beaufort, North Carolina.-Sept
- 2004 6th International Conf on Toxic Cyanobacteria-organizing committee-Bergen, Norway-June 21-25.
- 2007 7th International Conference on toxic Cyanobacteria-organizing committee-Rio de Janeiro, Brazil, August 5-12, 2007.

Special Conferences

Blue-green Algae and Public Health Supplies. City of Norman, Oklahoma. Envir. Council - March 1986 - invited speaker - 3 papers: Blue-green algae and Eutrophication; Global Overview on Blue-Green Algae toxins and Water Based Disease; Analysis of Lake Thunderbird for Algal Toxicity.

Field Experience (consulting)

Provincial Toxicology Laboratory - Alberta - Algal toxins - 1972-1975; 1987.

University of Idaho and Washington State University Veterinary Medicine. Algal Toxins and Animal Deaths. Lakes of Idaho and Washington. 1978.

State Health Departments and Water Quality Bureaus - Alaska, California, Delaware, Florida, Idaho, Indiana, Maine, Minnesota, Montana, Nevada, North Carolina, Oklahoma, Oregon, Pennsylvania, S. Dakota, N. Dakota, Texas, Virginia, Washington, Wisconsin, and Wyoming. Toxic Waterblooms. 1977-1993.

Provincial Health Departments - Canada - British Columbia, 1988; Manitoba, 1989-1993, Fisheries Canada - New Brunswick, 1988.

University of Illinois School of Veterinary Medicine; Poison Control Center - Identification of toxic algae in water supplies. 1984-1992.

British Columbia - Salmon Net Pen Liver Disease - Fisheries Canada - 1994.

Global Aqua - Olympia, Washington - Salmon Net Pen Liver Disease - 1994.

CUMAR, S.A. - Honduras S.A.- Taura Syndrome - maricultured shrimp - 1994.

Cartagenera de Aquaculture, Columbia, S.A. - 1995

Brazilian Health Authority - Pernambuco State, Recife - Human Deaths - 1996-1997

Ukrainian Academy of Sciences-Institute of Hydrobiology-Dnieper River Toxic Cyanobacteria Waterblooms-1998-99

State Water Authority for Sao Paulo, Brazil-CETESB-May 2000

State Water Authority for Minas Gerais, Brazil-COMPASA-May 2000

State Health Ministry for Rio do Janiero, Brazil-May 2000

National Health Authority for Brazil-through the Pan American Health Organization (PAHO)-Sept. 2000

Water Services Association of Australia-Algal toxin research and management guidelines-August 2000

Panama Canal Authority. Panama City, Panama. Gatun Lake drinking water supplies. October 2009-February 2010.

Graduate/Undergraduate Student Supervision

Undergraduate Special Research Projects (41)

M.Sc. students (13)

Ph.D. students (6). Pathology and Toxicology of peptide toxins produced by freshwater cyanobacteria. Isolation and characterization of cyanobacteria neurotoxins. Neurophysiology and toxicokinetics of cyanobacteria neurotoxins. Molecular biology of toxic cyanobacteria.

Post Doctoral Associates

1 - 1986-88
 1 - 1986-87
 1 - 1988-89
 1 - 1991-92
 1 -1999-2001
 1 - 2001-2004

Research Interests

Current Research Areas: Emphasize the following with regard to blue-green algae (cyanobacteria) toxins (biotoxins and cytotoxins):

1. Collection, isolation and culture of freshwater and marine toxic strains.
2. Large scale culture techniques for toxic strains.
3. Isolation and chemical characterization of pharmacologically active compounds.
4. Toxinology and pharmacology.
5. Induction and regulation of pharmacologically active compounds.
6. Biotechnology of algal and cyanobacteria secondary metabolites.
7. Molecular Taxonomy of toxigenic cyanobacteria
8. Management and mitigation of cyanobacteria harmful algae blooms (CyanoHABs)

Publications, book chapters and
papers/posters presented

Wayne W. Carmichael
Professor, Biological Sciences

in each
category

PO= poster presentations	105
P= oral paper presentations	120
IR= Invited/Reviewed paper	48
R= Reviewed papers	02
Ref = Refereed papers	145
(does not include papers submitted)	

Book/Manual/Report Publications

The Water Environment: Algal Toxins and Health. (1981) **W.W. Carmichael (ed.)**
Plenum Press - New York - V. 20 Environmental Series. 486 pp.

Cyanobacterial (Blue-green algal) Toxins: A Resource Guide. (1995) S.R. Yoo,
W.W. Carmichael, R.C. Hoehn and S.E. Hrudey. American Water Works
Association Research Foundation. Denver, CO. 229 pp.

Toxic Microcystis. (1996) M.F. Watanabe, K-I Harada, **W.W. Carmichael** and H.
Fujiki (eds.) CRC Press, Boca Raton - 262 pp.

Carmichael, W. (2001) Assessment of blue-green algae toxins in raw and finished
drinking water. American Water Works Association Research Foundation, Denver,
Colorado. Subject Area-Monitoring and Analyses. ISBN 1-58321-076-8. 179 pp.

Scientific Paper (P); Poster (PO) Presentations

(Presenter is underlined)

- P History, Occurrence and Taxonomy of Cyanobacteria Harmful Algae Blooms
(CyanoHABs). **Wayne Carmichael**. First International Symposium on
Cyanobacteria, Cyanotoxins, Water and Health. Rafael Landivar University,
Guatemala City, Guatemala. September 27-29, 2010. Plenary Paper. Supported
by USAID and the US embassy, Guatemala City.
- P **Microcystin exposure and biochemical outcomes among dialysis patients.**
Elizabeth Hilborn, Raquel Soares, Alvimar Delgado, Valéria Magalhães, **Wayne
Carmichael**, Jerome Servaites, Sandra MFO Azevedo. 8th-International
Conference Toxic Cyanobacteria. 29 August – 4 September 2010. Istanbul /
Turkey

- P Criteria for Quality Control Protocols for Various Algal Toxin Methods.** 2010. Gayle Newcombe, John Papageorgiou, Wasa Wickramasinghe, Glen Shaw, Geoff Eaglesham, **Wayne Carmichael**. Water Quality technology Conference, American Water Works Association. Nov. 14-17, 2010.
- P Allergic Manifestations of Non-toxic Extracts of Cyanobacteria in Humans.** Jonathan A. Bernstein, Debajyoti Ghosh, Linda S. Levin, Shu Zheng, **Wayne Carmichael**, Zana Lummus, I. Leonard Bernstein. 2010. Proceedings of the Allergy and Asthma Proceedings.
- P Environmental Impacts and Historical Perspectives on Harmful Algae Blooms in the Pacific Northwest.** Wayne Carmichael. Algae: Impact on Water Treatment Operations, Utility Management, and Public Health. Pacific Northwest Section-American Water Works Association, June 4, 2010. Salem, Oregon.
- P Cyanotoxins in Waters of the Klamath Basin: Historical Perspective and Current Risks.** Wayne Carmichael. Klamath Basin Science Conference, Medford, Oregon. February 1-5, 2010. United States Geological Service. Concurrent Technical Session on Toxic Algae in the Klamath Basin. Susan Corum, Session Chair.
- PO THE U.S. FRESHWATER HARMFUL ALGAL BLOOM RESEARCH & CONTROL ACT OF 2009.** Wayne Carmichael and H. Kenneth Hudnell. 5th Symposium on Harmful Algae in the U.S. November 15-19, 2009. Ocean Shores, Washington.
- P History and Biology of Cyanobacteria Harmful Algae Blooms: The CyanoHABs.** Wayne Carmichael. Symposium of the International Society of Limnology (SIL) 2009. Global Change and Freshwater Environments. October 24-27, 2009. Nanjing, China.
- P Management, Mitigation and Water Treatment of Cyanobacterial Blooms and Toxins.** Wayne W. Carmichael. 13th World Lake Conference. November 1-5, 2009. Wuhan, Hubei, China.
- P Cyanobacterial Cyanotoxins: Structure, Occurrence, Monitoring and Management Options and the Development of Human Risk Assessment Models.** Wayne Carmichael. 3rd Int. Conference on Natural Toxins. Cairo, Egypt, 16-18 December 2008.
- P Management and Mitigation of Cyanobacterial Toxins.** Wayne Carmichael. Int. Symposium on Health Risk, Management and Mitigation of Algal Toxins in Food and Drinking Water. Cairo, Egypt. 15 December 2008.
- P Cyanobacterial Cyanotoxins: Types, Occurrence, Structure, Detection and Monitoring.** Wayne W. Carmichael. EPICOH-NEUREOH 2008 San Jose, Costa Rica, June 9-13, 2008.

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- PO The cyanonet exercise: from situation assessment to recommendations.** G. A. Codd, S. M. F. O. Azevedo, S. N. Bagchi, M. D. Burch, W. W. Carmichael, W. R. Harding, T. Jurczak, K. Kaya, H. C. Utkilen, F. M. Young. 9th Pan-American Section Congress of the IST October 21-25, 2007, Juriquilla, Querétaro, México.
- PO No induction of chromosomal aberrations in *Cylindrospermopsin*-treated CHO-K1 cells with and without metabolic activation.** A. Lankoff, A. Wojcik, W. Carmichael, J. Bialczyk, J. Dziga, H. Lisowska. VIIth International Conference on Toxic Cyanobacteria, August 5-10, 2007, Rio de Janeiro State, Brazil.
- PO The cyanonet exercise: from situation assessment to recommendations.** G. A. Codd, S. M. F. O. Azevedo, S. N. Bagchi, M. D. Burch, W. W. Carmichael, W. R. Harding, T. Jurczak, K. Kaya, H. C. Utkilen, F. M. Young. VIIth International Conference on Toxic Cyanobacteria, August 5-10, 2007, Rio de Janeiro State, Brazil.
- P A human intoxication event by cyanotoxins during renal dialysis treatment in Caruaru, Brazil: 10 years after.** Wayne Carmichael, M.F.O. Azevedo, R. Molica, L.O. Azevedo, J. Brito, S. Coelho, V. Baretto. VIIth International Conference on Toxic Cyanobacteria, August 5-10, 2007, Rio de Janeiro State, Brazil.
- P A human intoxication event by cyanotoxins during renal dialysis treatment in Caruaru, Brazil: 10 years after.** Wayne Carmichael. Gordon Research Conference-Mycotoxins and Phycotoxins. June 17-22, 2007, Colby College, Waterville, Maine.
- P Characterization of thiaminase I activity in several North American species of cyanobacteria.** Donald E. Tillitt, James L. Zajicek, John Blakelock, Wayne W. Carmichael, John D. Fitzsimons, and Scott B. Brown. Fifth international Symposium on Aquatic Animal health, Sept. 2-6, 2006. San Francisco, Calif.
- P DNA damage and apoptosis in CHO-K1 cells following treatment with *Cylindrospermopsin*.** Anna Lankoff, Wayne W. Carmichael, Jan Bialczyk, Dariusz Dziga, Halina Lisowska, Andrzej Wojcik. Xth Int conf on Harmful Algae Blooms, Copenhagen, Denmark, Sept. 2006.
- P A 10 year overview of the human intoxication event by cyanotoxins during renal dialysis treatment in Caruaru – Brazil.** Sandra.M.F.O. Azevedo, Wayne.W. Carmichael. XI Congresso Brasileiro de Ficologia e Simpósio Latinoamericano sobre Algas Nocivas. March 26-April 1, 2006. Itajai, Santa Catarina, Brazil.

- P** **Blue-green Algae Toxins: A National Survey.** Wayne W. Carmichael. AWWA Source Water Protection Symposium-Palm Beach Gardens, Florida-Jan.24-26 2005.
- P** **The Microcystin Group of Cyanotoxins: Structure, Occurrence, Monitoring and Management Options and the Development of Human Risk Assessment Models.** Wayne W. Carmichael. USGS Public Health Microbiology Workshop-Columbus, Ohio-Feb 16, 2005
- P** **Management and Mitigation of Harmful Cyanobacteria Waterblooms: “The CyanoHABs”.** Wayne W. Carmichael. Midwest Aquatic Plant Management Society-Indianapolis, Indiana-March 6, 2005.
- P** **Identification of Cyanotoxins and the Development of Human Risk Assessment Models.** Wayne W. Carmichael. Microbial Pathogens in Drinking Water-USEPA-Fairborn, Ohio-April 25-28 2005
- P** **An Overview of Harmful Algae Waterblooms (HABs).** Wayne W. Carmichael. National Aquatic Plant Management Society-San Antonio, TX. July 9-13, 2005
- P** **One-hundred-twenty-seven years of research on toxic Cyanobacteria--Where do we go from here?.** Wayne W. Carmichael. Int. Soc. Appl. Phycology-Kunming, China-July 25-Aug 4, 2005-Plenary Speaker
- P** **A World Overview-One-hundred-twenty-seven Years of Research on Toxic Cyanobacteria--Where do we go from here?.** Wayne W. Carmichael. USEPA International Symposium – Toxic Cyanobacteria-RTP-North Carolina-Sept.06-10 2005
- P** **Serologic Evaluation of Human Microcystin Exposure.** Hilborn, E.D., Carmichael, W.W., Yuan, M., Sevaite, J.C., Barton, H.A., Azevedo, S.M.F.O. International Symposium on Cyanobacteria Harmful Algal Blooms. Research Triangle Park, North Carolina, USA. September 6-8, 2005
- P** **Identification of Cyanotoxins and the Development of Human Risk Assessment Models.** Wayne W. Carmichael. Society for Risk Analysis-Orlando, FL.-Dec 4-9, 2005
- PO** **Freshwater cyanotoxins and their measurement in water, food products and animal tissues.** Jerome C. Servaites, Jeanette S. Frey, E.A. Dale Allen, Wayne W. Carmichael. 119th AOAC Annual Meeting and Exposition, Orlando World Center Marriott, Orlando, Florida, September 11-15, 2005.
- P** **Analyses of Lesser Flamingo tissues and cyanobacterial assemblages for cyanotoxins from Lake Bogoria, Kenya, Africa.** Wayne W. Carmichael, Moucun Yuan, Jeanette Frey and John Blakelock. Univ of Ill. Dept Vet Sci. symposium on: Transdisciplinary Symposium on Recent Mass Die-offs of Lesser Flamingos (*Phoeniconaias minor*) in Eastern and Southern Africa’. Sept. 2004.

- P Cyanobacteria Harmful Algae Bloom Forensics – Helping the Pieces Fit.** W. Carmichael. 2004. National Water Quality Meeting and Forensic Hydrology Workshop. Loews Annapolis Hotel, Annapolis, Maryland. U.S. Geological Survey- August 31-September 2, 2004
- P The CyanoHABs: Effects on Water Quality and Water Use.** W. Carmichael. Your Water, Your Health Your Community. 2004. Tuesday, October 19, 2004. Statesville Civic Center, Workshop sponsored by the North Carolina Division of Environmental Health.
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- P Detection, Management and Mitigation of Harmful Cyanobacteria Waterblooms: “The CyanoHABs” 2004.** Wayne W. Carmichael. 54th Annual Environmental Engineering Conference-Feb. 4, 2004-Univ of Kansas-Lawrence, Ks. (Plenary address)
- P Gamma-irradiation-induced DNA damage and repair in human peripheral blood lymphocytes treated with microcystin-LR.** Lankoff, A., W. W. Carmichael, et al. (2004). The 33rd Meeting of the European Society for Radiation Biology, Budapest, Hungary.
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- P Evidence that microcystin-LR inhibits the repair of DNA helix-distorting lesions *in vitro*.** Lankoff, A., W. W. Carmichael, et al. (2004). XI International Conference on Harmful Algal Blooms, Cape Town, South Africa.
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- PO A Microcystin Reaction Study: Identification and Analyses Using SELDI-TOFMS and LC/MS/MS. Wayne W. Carmichael and Moucun Yuan. American Society for Mass Spectrometry. Annual meeting-Nashville TN. May 2004 (poster).
- PO Human Mortality from Accidental Ingestion of Toxic Cyanobacteria-A Case Re-examined Carmichael, W.W., Yuan, M., Friday, C. F.. 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO Analyses of Brazilian Strains of Anabaena for the Cyanotoxin Anatoxin-a(s) by LC/MS . Yuan, M., Carmichael, W. W.¹, Molica, R., Oliveira, E.J.A.. 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO The Evaluation of a Flocculating Agent (PUR®) for the Removal of Cyanobacteria and their Toxins from Potable Water Supplies. E. A. Dale Allen , Wayne W. Carmichael, & Bruce Keswick 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO Purification of the Cyanotoxin Anatoxin-a(s) and its use in Calibrating a Colorimetric Assay. Heather Lacey, Jerome Servaites, Renato Molica*, Wayne W. Carmichael, and Moucun Yuan. 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO An Enzyme-linked Immunosorbant Assay to Detect Microcystin in Human Serum. Hilborn ED , Carmichael WW , Servaites J , Yuan, M. Azevedo SMFO 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO Culture, Isolation and Analysis of Anatoxin-a, Cylindrospermopsin and Microcystin Producing Cyanobacteria in the St. Johns River Water Management District, Florida. Frey, J.S. and Carmichael, W.W. 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO CyanoHAB Search:A List of References to the toxin producing Cyanobacteria. Wayne W. Carmichael, Laurie A. Carmichael and Mary C. Stukenberg 6th Int. Conf on Toxic Cyanobacteria. Bergen, Norway, June 21-25, 2004 (poster).
- PO Current issues in the detection of human exposure to the cyanobacteria toxins, microcystins. Elizabeth D. Hilborn , Wayne W. Carmichael , Jerry Servaites, Sandra M.F.O. Azevedo. Sixteenth Conference of the International Society for Environmental Epidemiology. Annual Conf. New York City, New York. August 1-4, 2004. (poster)

- P Reimergence of Cyanobacterial harmful algae blooms in the Great Lakes-The CyanoHABs. Wayne Carmichael. Lake Erie Millennium Network-Third Biennial Conference. The Univ of Windsor, Ontario-May 6-7, 2003. (invited presenter)
- P Vulnerability of source waters to Cyanobacterial toxins-the Cyanotoxins. Wayne Carmichael. Mid-continent Lake and Reservoir Eutrophication Workshop. USGS-Denver, Colorado, Sept. 15-18, 2003. (invited presenter).
- P Development of biomarkers for microcystin analyses. W. Carmichael-special symposium-Toxins of Water Blooms-ESPCI-Paris, France-July 4, 2003. (invited)
- P North American studies with toxigenic *Cylindrospermopsis raciborskii*. W. Carmichael-special symposium-Toxins of Water Blooms-ESPCI-Paris, France - July 4, 2003 (invited)
- P US House of Representatives-Expert testimony-Thursday, March 13, 2003
Subcommittee on Environment, Technology, and Standards - Hearing
Harmful Algal Blooms and Hypoxia: Strengthening the Science
10:00 A.M. – 12:00 NOON
2318 Rayburn House Office Building (WEBCAST)
Contact:Republican Staff: Amy Carroll-Democrat Staff: Jean Fruci
- PO Driscoll, C.P., McGowan, P.C., Miller, E.A. and Carmichael, W.W. 2002. Case Report: great blue heron (*Ardea herodias*) morbidity and mortality investigation in Maryland's Chesapeake Bay. Proceedings of the Southeast Fish and Wildlife Conference, Baltimore, Maryland Oct. 24, 2002 (Poster).
- PO Hilborn, E.D., Carmichael, W.W., Azevedo, S.M.F. 2001. Investigation of serum microcystin concentrations among dialysis patients, Brazil, 1996. 1st Latin American Symposium on Toxic Cyanobacteria. Federal Univ. Rio de Janeiro. November 5-7, 2001. (Poster)
- P Carmichael, W.W. 2001. Occurrence of toxic cyanobacteria, monitoring and mitigation of problems related with cyanotoxins in drinking water. 1st Latin American Symposium on Toxic Cyanobacteria. Federal Univ. Rio de Janeiro. November 5-7, 2001. (Invited Paper)
- P Carmichael, W.W. 2001. Unregulated contaminant monitoring of freshwater algae toxins: US perspective. 2001 Water Quality Technology Conference (AWWA), Nashville, Tenn. November 11-15, 2001 (special session topic).
- P Carmichael, W.W. 2001. Health risk from toxic cyanobacteria exposure-Part 1.2001 Water Quality Technology Conference (AWWA), Nashville, Tenn. November 11-15, 2001 (special session topic).
- P Carmichael, W.W. 2001. The cyanotoxins-bioactive metabolites of cyanobacteria: occurrence, ecological role, taxonomic concerns and effects on humans.

Proceedings of the Phycological Society of America, Estes Park, Colorado, June 23-26, 2001. (special session presentation).

- PO Friday, C., Carmichael, W.W. 2001. Simultaneous analyses of cylindrospermopsin and anatoxin-a in water samples using LC/MS. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
- PO Brittain, S., Friday, C., Carmichael, W.W. 2001. LC-ESIMS/MS screen for combined analyses and characterization of alkaloid and cyclic peptide toxins produced by cyanobacteria. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
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- PO Babcock-Jackson, L., Carmichael, W.W., Culver, D.A. 2001. Toxic Microcystis in Lake Erie: Ecotoxicological relationships with three non-indigenous species increase risk to the aquatic community. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
- PO Pereira, P., Li, R.H., Carmichael, W. W., Dias, E., Franca, S. 2001. *Aphanizomenon gracile* LMECYA 40: Molecular identification and evidence of paralytic shellfish toxin production. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
- PO Carmichael, W.W., Ott, J., Li, R.H. 2001. The investigation of the cause of eared-grebe mortality at the Salton Sea: The role of cyanotoxins. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
- PO Jackson, W.C. Jr., Carmichael, W.W., Carpenter, E.J. 2001. The paralytic shellfish toxins, n-sulfocarbonyl and gonyautoxin, are the major neurotoxic factors associated with bloom-forming *Trichodesmium* sp. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
- PO Mohamed, Z.A., Carmichael, W.W., Hussein, A.A. 2001. Estimation of microcystins in the freshwater fish Oreochromis niloticus. Proceedings of the 5th International Conference on Toxic Cyanobacteria (ICTC), July 15-19, 2001, Noosa, Queensland, Brisbane, Australia (poster).
- P Carmichael, W.W. 2000. Health Effects of Toxin Producing Cyanobacteria: "The

CyanoHABs". Workshop-Water Quality-Algal Toxins-Federal Univ Rio do Janiero, Instituto Biofisica, June 2.

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- P Carmichael, W.W. 2000. Health Effects of Toxin Producing Cyanobacteria: "The CyanoHABs".Technical Seminar-toxic Algae Blooms-State Department of the Environment-Sao Paulo, Brazil (CETESB). May 26-27.
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- P Carmichael, W.W. 2000. Health Effects of Toxin Producing Cyanobacteria: "The CyanoHABs". Workshop-Control and Management of Cyanobacteria in Surface Water Supplies. National Secretary of Health-Lisbon, Portugal. May 9-10.
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- PO Kankaanpaa, H.T., V.O. Sepia, J.S. Kuparinen, J.L. Chizmar, W.W. Carmichael. 2000. Growth and toxicity of *Nodularia* bloom in the Western Gulf of Finland in August 1999. Ninth conference on Harmful Algal Blooms-Hobart,Tasmania, Australia, Feb. 2000.
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- P Carmichael, W.W. 1999. Detection and Analyses of Microcystins, Gordon Research Conf-Satellite Workshop on Analyses of Mycotoxins and Phycotoxins-Mt. Desert Is. Research Station-Salisbury Cove, Maine-June 17-19.
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- P Carmichael, W.W. 1999. Taxonomy of Toxic Cyanobacteria. 12th Int. Phytoplankton Taxonomy/Ecology Workshop, Univ. Manitoba, Canada, Sept. 6-16.
- P Carmichael, W.W. 1999. Toxins of Harmful Algae Blooms. Ohio Environmental Health Association-Southwest District-Fall Educational Conference-Sinclair College, Dayton, Oct. 6-7.
- PO Krasner, S., W. Carmichael, M. Deckard, J. An, F. Chu, X. Huang. 1999. Assessment of blue-green algal toxins in raw and finished drinking waters. AWWA Research Foundation-Annual Meeting-Chicago, Ill. June 23.
- PO Carmichael, W., J. An, L. Carmichael, M. Deckard, F. Chu, X. Huang, S. Krasner and M. Hasan. 1999. Assessment of blue-green algal toxins in raw and finished drinking waters. WSU-Dept Biol Sci-Research Forum-Sept. 6.
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- hemodialysis hospital in Caruaru. 1997 Brazilian Society of Nephrology - Annual Meeting. Water Treatment for Hospitals and Hemodialysis Usage. Recife, Pernambuco, Brazil, Nov. 20-22. (W.W. Carmichael).
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- P Liver Failure and deaths among patients at a hemodialysis center in Brazil. 36th Interscience Conference on Antimicrobial Agents and Chemotherapy. ICAAC-ASM Meetings. New Orleans, Louisiana. Sept. 15-18, 1996. (E.M. Jochimsen, D. Cardo, S.T. cookson, M.B.C. Antunes, C.E.M. Holmes, D.A. Mallo, W. Carmichael and W.R. Jarvis).
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- P Microcystin and the aquaculture industry. Seventh International Conference on Toxic Phytoplankton. July 12-16, 1995. Sendai, Japan. (Wayne Carmichael, N.R. Beetsch, J-S. An, M. Kent, J.M. Groff and J.A. Brock).
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- P Cyanobacterial Blooms and Health Hazards. International Society of Toxinology. Fifth Pan American Symposium on Plant, Animal and Microbial Toxins. Frederick, Maryland. July 30-August 3, 1995. (W.W. Carmichael-Plenary Lecture).
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- P Biological Monitoring and Analysis Aspects of Toxic Cyanobacteria - presented at the International Workshop on Toxic Cyanobacteria - Adelaide, Australia - March 22-26, 1994. (Wayne Carmichael).
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